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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/675,422	09/29/2000	Akira Yamaguchi	09792909-0431	3868

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 12/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/675,422

Applicant(s)

YAMAGUCHI ET AL.

Examiner

Susy N Tsang-Foster

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION***Response to Amendment***

This Office Action is responsive to the amendment filed on 6/24/2002. Claims 1, 13, 18, 22, and 27 have been amended and claim 4 has been canceled. Art rejections based on Inoue et al. of record are withdrawn in view of the present amendment. Claims 1-3, and 5-27 are pending. Claims 1-3 and 5-27 are finally rejected for the reasons of record and for reasons necessitated by the amendment.

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on have been disapproved because they introduce new matter into the drawings. 37 CFR 1.121(a)(6) states that no amendment may introduce new matter into the disclosure of an application. The original disclosure does not support the showing of continuous data points in Figures 2-4 by deletion of the triangles and circles. After further consideration by the Examiner, the objections to the original Figures 2-4 are withdrawn.

Claim Objections

Claim 16 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitation of claim 16 is already present in claim 14.

Art Unit: 1745

Claim 22 objected to because of the following informalities: In claim 22, the phrase “selected from the group consisting essentially of” is improper Markush language and should be written as “selected from the group consisting of”. Appropriate correction is required.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-3, and 5-27 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claims 1-3, and 5-27, the limitation “carbon fibers and carbon flakes disposed in the particulate negative electrode active material” is not in the original disclosure. The specification on page 3 discloses that the carbon fibers and carbon flakes can be disposed in the interstices between the negative-electrode material particles. The limitation “carbon fibers and carbon flakes disposed in the particulate negative electrode active material” suggests that the carbon fibers and carbon flakes are inside the particulate negative

Art Unit: 1745

electrode active material. For the purposes of prosecution of the instant application, this limitation is interpreted as “carbon fibers and carbon flakes disposed on the particulate negative electrode active material”.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 5-9, 11-14, 16, 17, 19-21, 24, 26, and 27 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by JP 08-287952 A.

See abstract; paragraph 13; paragraph 35 (table 2); paragraph 41; paragraph 43 (table 3); paragraph 49; paragraph 51; paragraph 52 of machine translation of reference.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1745

Claims 1-3 and 5-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0871233 A1 in view of JP 09-027344 A.

EP 0871233 A1 discloses a nonaqueous electrolyte secondary battery comprising a positive electrode comprising a positive-electrode active material capable of intercalating/deintercalating lithium; a negative electrode comprising a negative electrode active material capable of intercalating/deintercalating lithium and a nonaqueous electrolyte solution wherein the negative electrode further comprises carbon flakes (trademark name KS-15 from Lonza Ltd, see for example, page 21, line 15-20) and carbon granules (see page 23, lines 15-23, lines 30-35, lines 39-50, lines 55-58; page 24, lines 1).

The positive electrode active material can be a lithium transition metal oxide given by the general expression LiMO_2 where M is at least one element selected from the group consisting of Co, Ni, Mn, Fe, Al, V and Ti (page 23, lines 47-50) and the negative electrode may be a lithium metal oxide or graphite (page 5, lines 17-20; page 9, lines 15-25; page 24, line 1). Specifically, the negative electrode active material may be carbon material that has been carbonized and has been crushed or milled which would provide a particulate negative electrode active material (page 5, lines 54-58). The negative electrode active material may also be a graphite powder which is particulate (page 6, lines 28-50 and page 17, lines 10-46). The negative electrode active material may also be crushed lithium titanium oxide (page 9, lines 20-25).

The electrolyte solution in the battery may be a mixture of ethylene carbonate and dimethyl carbonate comprising LiPF_6 as the electrolyte salt (page 8, lines 5-26; page 9, lines 50-

Art Unit: 1745

55). Generally, the binder PVDF is used in the electrode of a lithium battery (page 9, lines 15-25).

EP 0871233 A1 does not disclose that the negative electrode comprises carbon flakes and carbon fibers.

JP 09-027344 A teaches adding 3 to 16 wt% of carbon flakes and carbon fibers to the positive electrode of a lithium battery with the mixing ratio of carbon flakes to carbon fibers of 85:15 to 25:75 which would be a ratio by weight of .25 to 5.66 carbon fibers to carbon flakes (see abstract). Calculations would indicate that this would be approximately .75 wt% of carbon flakes to 13.6wt% carbon flakes and .45 wt% carbon fiber to 12 weight percent carbon fiber in the positive electrode. JP 09-027344 A also teaches carbon fibers with the trademark name VCGF by Showa Denko KK and carbon flakes with the trademark name KS-15 are used in the positive electrode (see paragraph 121 of machine translation).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the carbon granules in EP 0871233 A1 with the carbon fibers of JP 09-027344 because they both serve the same purpose of maintaining the structural integrity of the electrode during the charge/discharge cycle as taught by JP 09-027344 in paragraph 19 (see machine translation) and by EP 0871233 A1 on page 5, lines 4-8. Since the carbon fibers used in JP 09-027344 has the same trademark name as that used by applicants, and the carbon flakes used in EP 0871233 A1 has the same trademark name as that used by applicants, the carbon fibers of JP 09-027344 and the carbon flakes of EP 0871233 A1 are expected to have the properties (such as diameter, length, and thickness) cited in the claims.

Art Unit: 1745

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to use 3 to 16 wt% of carbon flakes and carbon fibers with the mixing ratio of carbon flakes to carbon fibers of 85:15 to 25:75 in the negative electrode of EP 0871233 A1 because this proportion would give sufficient conductivity and structural strength to the electrode as taught by JP 09-027344 in paragraph 51 (see machine translation). Furthermore, EP 0871233 A1 discloses that the total amount of conductive agent (carbon flakes and carbon granules) in the negative electrode is 2 to 15% by weight (page 5, lines 1-3) and that the preferred mixing ratio between carbon flakes and granulated carbon is 90:10 to 20:80, which are nearly identical to the range of 3 to 16 wt % of the total conductive agent (carbon flakes and carbon fiber) and weight ratio of 85:15 to 25:75 (carbon flakes to carbon fibers) taught in JP 09-027344.

Claims 10, 22, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 08-287952 A in view of EP 0871233 A1.

JP 08-287952 A discloses all the limitations of claims 10, 22, 23, and 25 (see abstract; paragraph 13; paragraph 35 (table 2); paragraph 41; paragraph 43 (table 3); paragraph 49; paragraph 51; paragraph 52 of machine translation of reference) except that the electrolyte solution is a mixture of ethylene carbonate and dimethyl carbonate and that the binder in the electrodes is polyvinylidene fluoride.

Art Unit: 1745

EP 0871233 A1 teaches electrolyte solution is a mixture of ethylene carbonate and dimethyl carbonate and that the binder in the electrodes is polyvinylidene fluoride (PVDF) (page 9, lines 20-25 and lines 50-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a mixture of ethylene carbonate and dimethyl carbonate as the electrolyte solution in the nonaqueous battery of JP 08-287952 A because the mixture would be compatible with the graphite electrode active material in the negative electrode as taught by EP 0871233 A1 at page 8, lines 10-16).

It would have also been obvious to one of ordinary skill in the art to use PVDF as the binder in the electrodes of the nonaqueous battery of JP 08-287952 A because it is well known that PVDF is compatible with the electrolytic environment in the nonaqueous battery.

Response to Arguments

Applicant's arguments filed 6/18/2002 have been fully considered but they are not persuasive.

Applicants assert that JP 08-287952 A does not disclose a negative electrode formed with both carbon fibers and carbon flakes disposed in the particulate negative electrode active material.

In response, applicants have stated on page 4 of the amendment filed 6/18/2002 that JP 08-287952 A discloses a negative electrode formed with two distinct layers of carbon material in that a layer of spherical graphite is formed so that it contacts the collector, a second layer of scale-shaped graphite is then formed on the surface of the electrode and fibrous graphite can be

Art Unit: 1745

added to either or both of the two layers. The layer of spherical graphite contacting the collector can be interpreted as the particulate negative electrode active material. If the scale-shaped graphite (carbon flakes) is formed on the surface of the spherical graphite layer, the scaled-shaped graphite would also be disposed on the particulate negative electrode active material. The carbon fiber is also added to either of the two layers.

Applicants assert that the carbon granule in EP 0871233 A1 are present as the conductive material and do not provide for structural integrity and therefore the carbon granules and the carbon fibers do not both serve the same purpose and it would not have been obvious to replace one with the other.

The Examiner respectfully disagrees since paragraph 19 of the machine translation of JP 09-027344 teaches that the carbon fiber maintains the structural integrity of the negative electrode and page 5, lines 4-9 of EP 0871233 A 1 discloses that carbon granules provide strength to the negative electrode during charge and discharge.

Applicants questions that if it would have been obvious to include a mixture of flaky graphite and fibrous carbon to enhance the structural integrity of the negative electrode then why this was not suggested in the JP 09-027344?

In response, the Examiner would like to point out that the JP 09-027344 reference was used to provide motivation to modify the EP 0871233 A1 primary reference and not the reference itself that is providing the motivation.

Art Unit: 1745

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/28 September 2002


Patrick Ryan
Supervisory Patent Examiner
Technology Center 1700